



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

40

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,308	10/09/2003	Jin Li	M4065.0965/P965	7977
24998	7590	07/14/2006	EXAMINER	
DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403				HARRINGTON, ALICIA M
		ART UNIT		PAPER NUMBER
		2873		

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/681,308	LI ET AL.	
	Examiner	Art Unit	
	Alicia M. Harrington	2873	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on afterfinal arguments filed on 6/27/06.
 2a) This action is **FINAL**. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-9,11-27,30-45 and 56-62 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-9,11-27,30-45 and 56-62 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 09 October 2003 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____.
 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
 5) Notice of Informal Patent Application (PTO-152)
 6) Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see remarks page 2, filed 6/27/06, with respect to the rejection(s) of claim(s) 1-3,6-7,11-18,20,21,24,30,31,33-39,44,45,56-62 under Foster (US 6,643,386) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Suda (US 2003/0063204).

2. Applicant's arguments filed 6/27/06, with respect to the rejection claims 1, 17,24,36 under Tsuboi (US 2003/0063210) are not persuasive. Figure 5 shows the lens having spaces between adjacent columns but abutting within column. Figure 1, shows an embodiment where lens abuts on two sides and reflectors govern in the spaces where the lenses don't abut, as stated in section 37. Thus, the lenses abut unlike applicant argues. Further, if applicant would place nice circular objects in a 3 by 3 array with them touching. Applicant would see that the circular object in the middle would have 4 regions/edges/areas that don't touch and that would correspond to the reflector region. Thus the rejection will be repeated.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 6,7,11-17,19-21,36,37,44-45,57-60,62 are rejected under 35 U.S.C. 102(e) as being anticipated by Suda (US 2003/0063204).

Regarding claim 1, Suda discloses an image pickup apparatus comprising:

A micro-lens array, comprising (see figure 15 and 16):

A first set of micro-lenses (GREEN) comprising a plurality of first micro-lenses each having a first size and corresponding to a first color; and

A second set of micro-lenses (RED OR BLUE) comprising a plurality of second micro-lenses each having a second size and corresponding to a second color;

Wherein at least one of said plurality of first micro-lenses at least abuts without overlapping at least one of said plurality of second micro-lenses (SECTION 86 AND FIGURE 15);

The first set number is greater than a second set micro lenses (green-Bayer pattern) and both sets are regularly distributed.

Regarding claim 2, third set is red or blue responsive- Bayer Pattern.

Regarding claim 3, the micro lenses are the same size-figure 15.

Regarding claims 6 and 12-13, see Examiner notes in claim 1. Additionally, The Bayer array has a greater number of green color filters than red and blue.

Therefore, Suda teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green; first optical transmission property); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts the second set (section 86) and

number of first lenses is greater than the second (the number of lenses corresponding to the green color greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern-the Bayer color pattern.

Regarding claims 7 and 11, the lenses are the same size-figure 15.

Regarding claims 14-15, the third micro lens exhibits different optical transmission properties (red or blue).

Regarding claim 16, see figure 15.

Regarding claims 17 and 19-21, Suda discloses a semiconductor-based imager comprising:

A pixel array having embedded pixel cells (see figure 2 and element 102); and a micro lens array (201) comprising:

The Bayer array has a greater number of green color filters than red and blue. Therefore, Suda teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green; first optical transmission property); and a second micro lenses having a second size and corresponding second color (red or blue), the first set abuts (substantially space less) the second set (section 86) and number of first lenses is greater than the second (the number of lenses corresponding to the green color greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern-the Bayer color pattern.

Regarding claims 36 and 44-45, Suda discloses a semiconductor-based imager comprising:

A substrate having pixel cells (see figure 2 and element 102); and a micro lens array (201) comprising:

The Bayer array has a greater number of green color filters than red and blue. Therefore, Suda teaches an array where the first set of micro lenses having a first size and corresponding to a first color (green; first optical transmission property); and a second micro lenses having a second size and corresponding second color where the second size is not smaller than the first size (red or blue), the first set abuts (substantially space less) the second set (section 86) and number of first lenses is greater than the second (the number of lenses corresponding to the green color greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern-the Bayer color pattern.

Regarding claim 37, see figure 2.

Regarding claims 57-60 and 62, Suda discloses a Bayer arrangement (see figure 15).

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an

application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1,17,24, and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuboi (US 2003/0063210).

Regarding claim 1,17,24 and 36, Tsuboi discloses a micro lenses array comprising a first set micro lenses (Green), second set of micro lenses (Red or Blue), where the first and second abuts without overlapping (see figure 1;section 13), the first set number is greater than a second set micro lenses (green-Bayer pattern) and both sets are regularly distributed.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suda (US 2003/0063204).

Regarding claim 38, Suda teaches the color filter is positioned over the micro lens. Suda fails to specifically disclose an embodiment where the color filter is

between the micro lens and the substrate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to configure a color filter between the lens and the substrate because it is a well known color imager design and would provide the equivalent function of provide a desired color response to a particular lens.

9. Claims 4,5,8,9,22,23,40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda (US 2003/0063204 in view of Li (US 2002/0176037). Regarding claims 4-5,8-9 Suda fails to specifically disclose the focal length of each of the plurality of first micro lenses is equal to the second micro lenses.

In the same field of endeavor, Li teaches the lens curvature; thickness, material and resulting focal length are well known art optical calculations done to provide proper focus of the color/wavelength at the sensor (see sections 25-26). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made that focal lengths of the first and second are approximately equal because the pixel sites of the first and second lens are at the same depth and it assures each lens focuses light onto the pixel sight and not in the layers-loss light.

10. Claims 18,24,33,34,39,56,61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suda (US 2003/0063204) in view Hiroki (JP 2000-260968).

Regarding claims 18,39 and 61, Suda teaches the lens elements for the primary colors(R, G, B-Bayer arrangement) are the same size. Suda fails to specifically disclose an embodiment where the sizes of the lens differ.

In the same field of endeavor, Hiroki discloses a color image sensor where the sizes of the micro lenses for red and blue are larger than the micro lenses for the green pixel cells (see solution section). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suda, as taught by Hiroki, for the specific purpose of reducing noise in the low sensitivity colors.

Regarding claims 24,33,56 Suda discloses a semiconductor-based imager, comprising:

A substrate having pixel cells (see figure 2,element 102); and a micro lens array (201-figure 15) comprising:

A first plurality of first micro lenses each having a first size (green);

A second plurality of second micro lenses each having a second size (red or blue);

Wherein at least one of the second abuts without overlapping the first (see figure 15); and number of first lenses is greater than the second (the number of lenses corresponding to the green color greater in number corresponding to the blue or red); and wherein the first and second set are regularly distributed in accordance with a predetermined color pattern-the Bayer color pattern.

However, Suda fails to specifically disclose an embodiment where the second micro lenses are adapted to collect a greater amount of light than the first.

In the same field of endeavor, Hiroki discloses a color image sensor where the sizes of the micro lenses for red and blue are larger than the micro lenses for the green pixel cells (see solution section). Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Suda, as taught by Hiroki, for the specific purpose of reducing noise in the low sensitivity colors.

Regarding claim 34, Suda discloses the micro lenses are the same size. Hiroki teaches a color imager where two color lens sizes are the same (in the case the red and blue) and one is different. Thus, Suda and Hiroki teach altering the lens size to collect more of two colors. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make two color in a color imager the same for collection efficiency to effect overall color output.

11. Claims 24-27,30-33,35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hokari (US 5,493,143) in view of Suda (US 2003/0063204). Regarding claims 24 and 35, Hokari discloses a semiconductor-based imager, comprising:

a substrate (1) having pixel cells formed thereon (see col. 3, lines 40-50), each with a see (2);

a micro-lens array (9), comprising:

a first plurality of first micro-lenses each having a first size (for example 9G); and

a second plurality of second micro-lenses each having a second size (for example 9R- height or 9B-surface area; see col. 6, lines 40-61) larger than said first size (9G-see figures 8-11);

wherein said second micro-lenses (for example 9B) are adapted to collect a greater amount of light than said first micro-lenses (9G- the Blue lens is larger surface area-see for example figure 11). Hokari fails to specifically disclose the semiconductor-based imager of claim 24, wherein at least one of said second micro-lenses abuts at least one of said first micro-lenses.

Suda teaches a micro lenses on an color imager that abut/connect (see section 86).Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to abut at least one of a first and second micro lenses, to improved detection efficiency and increase resolution, as taught by Suda. It would have been further obvious to provide a color filter pattern such that the first micro-lenses is greater in number than a second plurality of micro-lenses (such as a Bayer color pattern), since the Bayer arrangement is well known and the human eye is most sensitive to the Green color in which the green color is sampled at twice the rate of blue and red to provide a good color image.

Regarding claim 25, Hokari discloses the semiconductor-based imager of claim 24, wherein said first (9G) and said second (for example 9B) micro-lenses each exhibit a similar focal length (In one embodiment, the micro lens material is wavelength selective and the light for individual wavelengths are focused at the photo sensor- see figures 9, 10e and 11- col. 5,lines and 15-20 and 50-55).

Regarding claim 26, Hokari discloses the semiconductor-based imager of claim 25, wherein said focal length extends to said photo sensors (see figure 9 and col. 5, lines 15-20).

Regarding claim 27, Hokari discloses the semiconductor-based imager of claim 24, wherein a focal length of the plurality of first micro-lenses is adjusted for a first color signal, and wherein a focal length of the plurality of second micro-lenses is adjusted for a second color signal (In the embodiment of figure 8, each lens had a different curvature and thickness-see col. 5, lines 25-50).

Regarding claim 30, Hokari discloses the semiconductor-based imager of claim 24, further comprising a color filter array (20G, 20R, 20B) positioned over said pixel cells (see figure 9; col. 5, lines 55-65).

Regarding claim 31, Hokari discloses the semiconductor-based imager of claim 30, wherein said color filter (20G, 20R, 20B) array is positioned between said micro-lens array (9) and said wafer (1).

Regarding claim 32, Hokari discloses the semiconductor-based imager of claim 24, further comprising a light shield (7) positioned between said micro-lens array (9) and said wafer (1).

Regarding claim 33, Hokari discloses the semiconductor-based imager of claim 24, wherein said micro-lens array further comprises a third plurality of third micro-lenses each having a third size (for example 12 R).

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alicia M. Harrington whose telephone number

is 571 272 2330. The examiner can normally be reached on Monday - Thursday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Mack can be reached on 571 272 2333. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Alicia M Harrington
Primary Examiner
Art Unit 2873

AMH